REMARKS

In response to the final Office Action of December 12, 2008, applicant asks that all claims be allowed in view of the following remarks. Claims 1, 7, 18, 20, 21, 28, 59, 60, 63-66, and 71-87 are pending, of which claims 1, 18, 20, 76, and 82 are independent. Claims 2-6, 8-17, 19, 22-27, 29-58, 61-62, 67-70 have been cancelled.

A request for continued examination is being filed concurrently with this response.

Claim Rejections—35 U.S.C. § 103

Claims 1, 7, 18, 20, 21, 28, 59, 60, 63-66, and 71-87 have been rejected as being unpatentable over U.S. Patent No. 6,373,454 (Knapp) in view of U.S. Patent No. 6,369,786 (Suzuki) and U.S. Patent Application Publication No. 2003/0231152 (Shin). Applicant requests withdrawal of this rejection for the reasons discussed below.

Claims 1, 7, 64, 71- 73, 76-81

Among other features, each of independent claims 1 and 76 recites a driven circuit including a first transistor, a signal line electrically connected to the first transistor through a node, and a first precharge circuit electrically connected to the signal line and including a second transistor. A gate width of the second transistor is larger than a gate width of the first transistor.

Applicant requests reconsideration and withdrawal of this rejection because it would not have been obvious to modify Knapp and Suzuki with Shin to include a second transistor having a gate width larger than the gate width of the first transistor.

Knapp relates to an active matrix display device. See Knapp at abstract. In Knapp, a switch 33 connects a display element 20 to a drive transistor 30. See Knapp at col. 6, lines 21-25 and FIG. 2. When the switch 33 is closed, the transistor 30 draws current through the display element 20 so as to produce the required amount of light from the display element 20. See Knapp at col. 6, lines 50-53. An input line 35 connects a switch 37 to a node 36 (see Knapp at col. 6, lines 39-43), and an input signal I_{in} corresponding to the current required for the display element 20 is driven through the transistor 30 via the input line 35 (see Knapp at col. 6, lines 63-75 and FIG. 2).

Suzuki relates to matrix driving techniques for current-driven display elements. See Suzuki at col. 1, lines 8-9. A matrix driving apparatus (or matrix drive) includes scanning electrodes and signal electrodes, current-driven display elements located at the intersection of the scanning and signal electrodes, and a precharge circuit connected to the signal electrodes. See Suzuki at col. 3, lines 52-64. In one aspect of Suzuki, a precharge circuit 3A includes diodes D_1 to D_x, each of which is connected to a corresponding one of signal electrodes SiE_1 to SiE_x. See Suzuki at col. 5, lines 50-52 and FIG. 7.

Shin relates to an image display having pixels that are formed at an intersection of scan and data lines. See Shin at ¶ 0008. Each of the pixels includes a light-emitting element and two transistors, M1 and M2, that form a current mirror. See Shin at ¶ 0014 and FIG. 2. The channel width of the transistor M2 is greater than the channel width of the transistor M1. See Shin at ¶ 0016.

The Office appears to equate Knapp's transistor 30 with the recited first transistor and Suzuki's diode D_x with the recited second transistor. See the final Office Action at page 4. However, the Office acknowledges that Knapp does not disclose a pre-charge circuit that includes the second transistor or that a gate width of the second transistor is larger than a gate width of the first transistor. See the final Office Action at page 4. For these features, the Office Action respectively relies on Suzuki and Shin. In particular, the Office Action asserts that "it would have been obvious … to modify Knapp with the teachings of Suzuki, precharge voltage being supplied to a node prior to supplying a signal current" and that "it would have been obvious to modify Knapp and Suzuki with the teachings of Shin, gate width of the second transistor being larger than the gate width of the second transistor, because it allows for greater current to flow from the precharge circuit, which allows for a faster precharge." See the final Office Action at pages 4-5. Applicant disagrees that it would have been obvious to modify Knapp and Suzuki with Shin in the manner suggested by the Office.

In suggesting that Knapp and Suzuki be combined, the Office appears to suggest that Suzuki's precharge circuit 3A, which includes the diode D_x, be connected to Knapp's signal line 35 and node 36. Even assuming that Knapp and Suzuki could be combined in this manner, it would not have been obvious to further modify Knapp and Suzuki with Shin's transistors M1 and M2.

First, it would not have been obvious to modify Knapp and Suzuki with the transistors M1 and M2 of Shin because Shin specifically arranges the transistors M1 and M2 as a current mirror, but, in the configuration suggested by the Office, the elements the Office proposes to modify with the transistors M1 and M2, Knapp's transistor 30 and Suzuki's diode D_x, would not be arranged as a current mirror. By relying on Shin to show that a gate width of the second transistor M2 is larger than a gate width of the first transistor M1, the Office appears to argue that Suzuki's diode D_x would be replaced with Shin's transistor M2 and that Knapp's transistor 30 would be replaced with Shin's second transistor M1. Thus, according to the rejection, the transistor M2 would be connected to the transistor M1 through Knapp's input signal line 35 and node 36. However, in this configuration, the transistors M1 and M2 would not form a current mirror.

Shin notes that, in some display apparatuses in which the current for driving a data line must be equal to the current flowing to an OLED, driving the data line may be slow (see Shin at ¶ 0012), and, at paragraph 0014, Shin indicates that the speed of driving the data line may be improved by using the current mirror formed from the transistors M1 and M2. Thus, Shin touts the benefits of arranging M1 and M2 to form a current mirror, and there would have been no reason to arrange the transistors M1 and M2 in a configuration different from that discussed in Shin. However, there is no indication that, even if Knapp and Suzuki could somehow be combined in the configuration suggested by the Office, that Knapp's transistor 30 and Suzuki's diode D_x would form a current mirror. Accordingly, it would not have been obvious to modify Knapp's transistor 30 with Shin's transistor M1 and Suzuki's diode D_x with Shin's transistor M2.

Second, the Office's rationale for combining Knapp and Suzuki with Shin does not provide a sufficient reason for combining these references. Specifically, the Office argues that "it would have been obvious to modify Knapp and Suzuki with the teachings of Shin, gate width of the second transistor being larger than the gate width of the first transistor, because it allows for greater current to flow from the precharge circuit, which allows for a faster precharge." Applicant disagrees. As explained in Shin, the channel width of the transistor M2 that forms the current mirror is greater than that of the transistor M1 that drives the OLED, and, as a result, the current flowing to the transistor M2 is higher than that flowing to the transistor M1 in a predetermined manner. However, it is not necessarily the case that the width of the second

transistor (M2) being larger than the width of the first transistor (M1) allows for a faster precharge time. For example, in the case where a constant current is supplied to the transistors M1 and M2, if the channel width of the transistor M2 is unchanged, and the channel width of the transistor M1 is shortened, the current flowing to the driven circuit from the transistor M2 does not increase because the channel width of the transistor M2 has not changed.

Thus, it would not have been obvious to modify Knapp and Suzuki with the teachings of Shin.

For at least this reason, applicant requests reconsideration and withdrawal of the rejection of independent claims 1 and 76, and their dependent claims 7, 64, 71- 73 and 76-81.

Claims 18, 28, 59, 66, 74, and 82-87

Among other features, each of independent claims 18 and 82 recites a driven circuit including a first transistor, a precharge circuit including a second transistor, a first switch for controlling an electrical connection between the driven circuit and the precharge circuit, and a second switch for controlling an electrical connection between the driven circuit and a current source circuit.

No proper combination of Knapp, Suzuki and Shin describes or suggests these features.

In Knapp, a drive transistor 30 is connected to a display element 20 through a switch 33. See Knapp at col. 6, lines 21-26 and FIG. 2. A display element 20 is associated with a switch 33 that, when closed, applies a data signal that sets the current passing through the display element 20 and, thus, the light that is output by the display element 20. See Knapp at col. 6, lines 6-11. The data signals are provided by column driver circuit 18, which acts as a current source. See Knapp at col. 6, lines 12-13. In particular, an input current signal (I_{in}) is driven from the column driver circuit 18 (e.g., the current source) through a node 36 to a drive transistor 30 by way of an input line 35. A switch 37 controls the application of the input current signal to the node 36. See Knapp at col. 6, lines 63-67 and FIG. 2. When the switch 37 is closed, the input current signal flows through the node 36 and generates a gate-source voltage at the transistor 30, and the voltage is stored in a capacitor 38. See Knapp at col. 44-49 and FIG. 2. When the switch 33 is closed, the display element 20 is connected to the drain of the transistor 30, and the transistor 30 draws current through the display element 20 according to the level of stored voltage such that

light is output from the display element 20. See Knapp at col. 6, lines 49-53 and col. 7, lines 13-15.

Thus, in Knapp, the switch 37 controls an electrical connection between a current source circuit (e.g, the column driver circuit 18) and the drive transistor 30, and the switch 33 controls an electrical connection between the display element 20 and the drive transistor 30.

The Office acknowledges that Knapp "does not disclose a precharge circuit" and relies on Suzuki's precharge circuit 3A for this feature. See the final Office Action at page 6. In Suzuki, the precharge circuit 3A includes a diode D_x that is connected to a signal electrode S_iE_x. See Suzuki at col. 5, lines 50-52 and FIG. 7. The electrode S_iE_x connects a current source C_{sx} that supplies current to a corresponding organic electroluminescent element. See Suzuki at col. 5, lines 9-12 and FIG. 7.

Even if Knapp could somehow be modified to include Suzuki's precharge circuit 3A, the combination would not result in a first switch for controlling an electrical connection between the driven circuit and the precharge circuit and a second switch for controlling an electrical connection between the driven circuit and a current source circuit, as recited in independent claim 18.

First, if Knapp's input signal line 35 was modified with Suzuki's signal electrode SiEx, Suzuki's diode D_x would be connected to Knapp's drive transistor 30 through the node 36, and the combination would not include a switch for controlling an electrical connection. Thus, the combination of Knapp and Suzuki does not describe or suggest a first switch for controlling an electrical connection between the driven circuit and the precharge circuit.

Second, even if Suzuki's precharge circuit 3A could somehow be connected to Knapp's drive transistor 30 through the switch 33, the combination would not include a first switch for controlling an electrical connection between the driven circuit and the precharge circuit. At page 6, the final Office Action equates Knapp's switch 33 with the recited first switch. However, as seen in Figure 2 of Knapp, the switch 33 is located between the display element 20 and the node 36. Thus, if Knapp's switch 33 could somehow be equated with the recited first switch, the precharge circuit 3A of Suzuki would be located between the drive transistor 30 and the display element 20. It is unclear how Knapp's display device would work if such a modification were made.

Third, it would not have been obvious to modify Knapp to connect Suzuki's precharge circuit 3A through Knapp's switch 37. In the Response to Arguments section at page 2 of the final Office Action, the Office asserts that the "precharge circuit of Suzuki would be connected to the driven circuit of Knapp through the switch 37 which would control the electrical connection between the driven circuit and the precharge circuit." Thus, though as noted above, the Office equates the recited first switch with Knapp's switch 33, the Office also appears to equate Knapp's switch 37 with the recited first switch for controlling an electrical connection between the driven circuit and the precharge circuit. This, in turn, would seem to require the Office to equate Knapp's switch 33 with the recited second switch for controlling an electrical connection between the driven circuit and a current source circuit.

Applicant disagrees that Knapp's switch 37 may be equated with the recited first switch or that Knapp's switch 33 may be equated with the recited second switch. As discussed above, Knapp's switch 33 controls an electrical connection between the display element 20 and the drive transistor 30 such that the drive transistor 30 draws current through the display element 20 when the switch 33 is closed. The display element 20 produces light in response to data signals, and does not act as a current source circuit. Thus, Knapp's switch 33 is not a switch that controls an electrical connection between a driven circuit and a current source circuit. Instead, Knapp's switch 37 appears to control an electrical connection between the drive transistor 30 and the column driver circuit 18, which, as Knapp points out, acts as a current source circuit. Moreover, even if the precharge circuit 3A could be connected to the drive transistor 30 through the switch 37, the switch 37 would connect the transistor 30 to both the current source (e.g., the column driver circuit 18) and the precharge circuit 3A. Thus, the combination would not include a first switch for controlling an electrical connection between the driven circuit and the precharge circuit and a second switch for controlling an electrical connection between the driven circuit and a current source circuit.

Accordingly, no proper combination of Knapp and Suzuki describes or suggests a driven circuit including a first transistor, a precharge circuit including a second transistor, a first switch for controlling an electrical connection between the driven circuit and the precharge circuit, and a second switch for controlling an electrical connection between the driven circuit and a current source circuit, as recited in independent claims 18 and 82.

Shin, which is cited as showing a gate width of a second transistor is larger than a gate width of a first transistor, does not remedy the failure of the combination of Knapp and Suzuki to describe or suggest the noted feature of independent claims 18 and 82.

For at least this reason, applicant requests reconsideration and withdrawal of the rejection of independent claims 18 and 82, and their dependent claims 28, 59, 66, 74, and 83-87.

Claims 20, 21, 60, 63, 65, and 75

Independent claim 20 recites a driven circuit including a first transistor, plural precharge circuits, plural current source circuits configured to input a current signal to the driven circuit, a first switch for controlling an electrical connection between the driven circuit and plural current source circuits, and a second switch for controlling an electrical connection between the driven circuit and the plural current source circuits.

No proper combination of Knapp, Suzuki and Shin describes or suggests a second switch for controlling an electrical connection between the driven circuit and the plural current source circuits.

In Knapp, an input current signal (I_{in}) is driven from a column driver circuit 18 through a node 36 to a drive transistor 30 by way of an input line 35. A switch 37 controls the application of the input current signal to the node 36. See Knapp at col. 6, lines 63-67 and FIG. 2. The Office equates Knapp's transistor 30 with the recited driven circuit and the switch 37 with the recited second switch for controlling an electrical connection between the driven circuit and the plural current source circuits. See the final Office Action at page 7. The Office acknowledges that Knapp does not disclose plural precharge circuits and plural current source circuits configured to input a signal current to the driven circuit. For these features, the Office relies Figure 4 of Suzuki to show plural precharge circuits and plural current source circuits.

However, even if the switch 37 could be equated with the recited second switch, the combination of Knapp and Suzuki still would not describe or suggest a second switch for controlling an electrical connection between the driven circuit and the plural current source circuits. In particular, if Suzuki could be combined with Knapp in the manner suggested by the Office such that Knapp includes Suzuki's precharge circuit 3A, the transistor 30 (which is equated with the driven circuit) would be connected to one of Suzuki's current sources CX_s

through the node 36. Thus, Knapp's switch 37 would control an electrical connection between a driven circuit (transistor 30) and a single current source rather than between a driven circuit and multiple current source circuits.

Accordingly, for at least the reason that no proper combination of Knapp and Suzuki describes or suggests a second switch for controlling an electrical connection between the driven circuit and plural current source circuits, and because Shin does not remedy this failure of Knapp and Suzuki, applicant requests reconsideration and withdrawal of the rejection of claim 20 and its dependent claims 21, 60, 63, 65, and 75.

Conclusion

Applicant submits that all claims are in condition for allowance.

It is believed that all of the pending issues have been addressed. However, the absence of a reply to a specific rejection, issue or comment does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this reply should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this reply, and the amendment of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment.

Fees in the amount of $810 for the request for continued examination are being paid concurrently herewith on the Electronic Filing System (EFS) by way of Deposit Account authorization. No other fees are believed due. Nonetheless, please apply any other charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

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